## REMARKS

The Applicants respectfully request reconsideration of the present Application in view of the foregoing amendments and in view of the reasons that follow.

Claims 30-71 have been amended.

Claims 72-83 have been added to present claims of varying scope.

This amendment adds, changes and/or deletes claims in this Application. A detailed listing of claims that are, or were, in the Application, irrespective of whether the claim(s) remain under examination in the Application, is presented, with an appropriate defined status identifier.

Claims 30-83 are now pending.

The Applicants believe that the present Application is now in condition for allowance. Favorable reconsideration of the Application as amended is respectfully requested.

## Nonstatutory Double Patenting Rejection

On page 2 of the Office Action, the Examiner rejected Claims 30-71 under the judicially created doctrine of double patenting over the copending Claims 51-90 of U.S. Application No. 09/696,109 ("the '109 Application"). The present Application and the '109 Application are commonly owned.

The Applicants request that the provisional double patenting rejection of Claims 30-71 over Claims 51-90 of the '109 Application be held in abeyance until allowable independent claims are indicated by the Examiner in the present Application (since a timely filed terminal disclaimer would overcome the rejection such that further consideration of the claims on that rejection should not be necessary). 37 C.F.R. § 1.111(b).

## Claim Objections

On page 4 of the Office Action, the Examiner objected to Claim 67 and stated that "in line 1 'plat' should be 'plate'." Claim 67 has been amended. The Applicants respectfully request the withdrawal of the objection.

## Claim Rejections – 35 U.S.C. § 112 ¶ 2

On page 4 of the Office Action, the Examiner rejected Claims 33-35, 37, 58-61 and 63-70 under 35 U.S.C. § 112 ¶ 2 as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. Claims 33-35, 37, 58-61 and 63-70 have been amended, are definite and in compliance with 35 U.S.C. § 112 ¶ 2. The Applicants request withdrawal of the rejection of Claims 33-35, 37, 58-61 and 63-70 under 35 U.S.C. § 112 ¶ 2.

## Claim Rejections – 35 U.S.C. §§ 102(e)/103(a) – Larsen et al. '566

On page 6 of the Office Action, the Examiner rejected Claims 30-71 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,948,566 titled "Method for Making Lead-Acid Grids and Cells and Batteries Using Such Grids" to Larsen et al. ("Larsen et al. '566").

The Examiner stated that:

> [Larsen et al. '566] teaches a sealed lead-acid battery (col. 11, lines 35-39) having a positive plate, a negative plate and a separator between the plates (col. 8, lines 20-36). An active material paste is applied to a grid supporting structure to form the positive plate (col. 7, lines 24-43). The positive grid alloy comprises a lead-based calcium-tin-silver alloy in which, based upon the total weight of the alloy, calcium is present in a range of from about 0.01% to 0.06%, tin is present in a range of from about 0.3% to 1.0% and silver is present in a range of about 0.01% to 0.06%. Note the ratio of tin to calcium may be greater than 20:1. Optionally, aluminum can be included in an amount from about 0.003% to 0.010%. See col. 11, lines 7-14. The sealed lead-acid battery may be used in automotive applications (col. 10, lines 64-67).

Larsen et al. '566 is directed to a "method of making lead-acid grids and cells and batteries using such grids" and a "continuous process for making a directly cast strip to provide a thickness satisfactory for industrial cells" (emphasis added) (see Abstract). Larsen et al. '566 acknowledges a distinction between "thinner grids for SLI batteries" and "thicker grids for

industrial applications" (see col. 3, lines 63-65) (emphasis added). Larsen et al. '566 states that "[i]t is accordingly a principal object of the present invention to provide a commercially viable process for making grids suitable for lead-acid cells for industrial/battery applications" (emphasis added) (see Background of the Invention, col. 3, lines 36-40). Larsen et al. '566 also states that "[t]he present invention is, in general, predicated on the discovery that a continuous method of making grids of thicknesses suitable for industrial battery applications can be achieved" (emphasis added) (see col. 3, lines 59-62). Larsen et al. '566 further states:

> While the present invention will be described herein principally in connection with making grids and plates for VRLA sealed lead-acid cells and batteries, it should be appreciated that this invention is equally applicable to making grids and plates for flooded electrolyte cells and batteries for use in industrial battery applications. Such applications are known, and some have been discussed herein. Indeed, the present invention is useful in making thick grids and plates for any desired lead-acid cell/battery application.

See Background of the Invention, col. 3, lines 44-56 (emphasis added). Larsen et al. '566 further states that "[t]he grids thus made find substantial utility in sealed lead-acid batteries and in other cells and batteries for industrial applications" (col. 11, lines 35-37) (emphasis added).

Independent Claim 30 of the present Application is directed to a "lead-acid cell for an SLI battery configured for use in vehicle applications" comprising, in combination with other elements, a "thin grid supporting structure" and an alloy comprising "a silver content in the range of greater than 0 to less than 0.015 percent."

Independent Claim 44 of the present Application is directed to a "grid supporting structure for use in a lead-acid cell for an SLI battery configured for use in vehicle applications" comprising, in combination with other elements, a "at least one thin positive plate formed by book mold gravity casting" and an alloy comprising "silver in the range of greater than 0 to less than 0.015 percent."

Independent Claim 57 of the present Application is directed to a "plate formed by book mold gravity casting into a thin grid supporting structure for use in a lead-acid cell for an

SLI battery configured for use in vehicle applications" comprising, in combination with other elements, "silver in an amount of greater than 0 to less than 0.015 percent."

As to the alloy composition of the lead acid grids and cells, Larsen et al. '566 includes the following paragraphs:

> As far as the positive grids are concerned, one type of the preferred grid alloys comprise lead-based calcium-tin-silver alloys in which, based upon the total weight of the alloy, calcium is present in a range of from about 0.01% to 0.06%, tin is present in a range of from about 0.3% to 1.0% and silver is present in a range of about 0.01% to 0.06%. Optionally, to prevent drossing, aluminum can be included in an amount from about 0.003% to 0.010%.
>
> For the extended service life applications, such as telecommunications, where 10 to 20 years of service are desired, grid alloys imparting high mechanical properties to the resulting grid are preferred. One desirable family of alloys comprises lead-based alloys including about 0.02% to 0.05% calcium, from about 1.5% to 3.0% tin, and from about 0.01% to 0.05% silver. To prevent drossing of calcium, aluminum in an amount of from about 0.003% to 0.010% may be used.

Col. 11, lines 7-22 (emphasis added). The range of tin in "[o]ne desirable family of alloys" is "from about 1.5% to 3.0% tin." See Larsen et al. '566 at col. 11, lines 19-20 (emphasis added). The range of silver is in a range of no less than 0.01 percent to up to 0.05 percent or 0.06 percent in each of the alloys in Larsen et al. '566.

Notably, Larsen et al. '566 does not disclose any specific examples of an alloy having a composition as recited in Claims 30-71 of the present Application. Accordingly, Larsen et al. '566 does not actually teach any alloy (having a composition as claimed in the present Application) with "sufficient specificity" to constitute anticipation of Claims 30-71. See M.P.E.P. § 2131.03 ("In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with sufficient specificity to constitute an anticipation under the statute."). Larsen et al. '566 does not identify any unexpected result achieved by an alloy having a composition as recited in Claims 30-71 of the present Application. Larsen et al. '566 discloses no understanding of the effects realized in the claimed narrow ranges of the alloy composition of Claims 30-71.

The present Application discloses unexpected results within the claimed narrow ranges of the alloy composition of Claims 30-71. Compare for example Figure 6 of the present Application. Larsen et al. '566 does not identically disclose the alloy having a composition as recited in independent Claims 30, 44, and 57.

The rejection of Claims 30-71 as anticipated by Larsen et al. '566 under 35 U.S.C. § 102(e) is improper. Claims 30-71 are patentable over Larsen et al. '566 under 35 U.S.C § 102(e).

On page 7 of the Office Action, the Examiner stated that "[t]he claims are alternatively unpatentable." The Examiner stated that "[t]he claim limitation 'formed by book mold gravity casting' is a product-by-process limitation" and that "[t]he courts have ruled that product-by-process limitation, in the absence of unexpected results, are obvious." The Examiner also stated that Larsen et al. '566 "at least suggests the grids may be made by gravity casting."

The alloy having a composition as recited in independent Claims 30, 44, and 57 would not have been obvious in view of Larsen et al. '566, alone or in any proper combination under 35 U.S.C. § 103(a). Larsen et al. '566 alone or in any proper combination does not disclose, teach or suggest an alloy, comprising, in combination with other elements, a "thin grid supporting structure for the positive plate formed by book mold gravity casting," as recited in Claims 30-43 and 71, a "thin positive plate formed by book mold gravity casting," as recited in Claims 44-56, and a "plate formed by book mold gravity casting into a thin grid supporting structure" as recited in Claims 57-70. To transform the "lead-acid grids and cells" of Larsen et al. '566 (e.g. thick grid for industrial cells) into a "thin grid supporting structure for the positive plate formed by book mold gravity casting" (independent Claim 30), a "thin positive plate formed by book mold gravity casting" (independent Claim 44) and "a plate formed by book mold gravity casting into a thin grid supporting structure" (independent Claim 57) with an alloy composition that achieves the unexpected results set forth in the present Application (as recited in Claims 30-71) would require still further modification, and such modification is taught only by the Applicants' own disclosure. The suggestion to make the combination has been taken from Applicants' own specification (using hindsight), which is improper.

The alloy having a composition as recited in independent Claims 30, 44, and 57, considered as a whole, would not have been obvious in view of Larsen et al. '566. The rejection of Claims 30-71 over Larsen et al. '566 under 35 U.S.C. § 103(a) is improper. Claims 30-71 are patentable over Larsen et al. '566.

**Claim Rejections 35 U.S.C. § 103(a) – Larsen '451**

On page 7 of the Office Action, the Examiner rejected Claims 30-71 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,423,451 to Larsen titled "Lead-Acid Cell and Positive Plate and Alloy Therefor" to Larsen ("Larsen '451").

The Examiner stated that:

> [Larsen '451] teaches a sealed lead-acid cell having a container, a positive plate, a negative plate and a separator between the positive and negative plate (col. 8, lines 30-42). The positive plate comprises a grid and a positive active material pasted onto the grid (col. 8, lines 8-12). [Larsen '451] teaches that the grid supporting structure comprises a lead-based alloy consisting essentially of lead, from about 0.02% to about 0.05% calcium, from about 1.5% to about 3.0% tin and from about 0.01% to about 0.05% silver (see abstract). Note the tin to calcium ratio is greater than 20:1. Optionally, the alloys can include from about 0.003% to 0.03% by weight of aluminum (col. 5, lines 8-9). [Larsen '451] teaches that the grids may be formed by conventional casting techniques such as gravity casting ("book molds" or the like) and continuous processes using expanded metal techniques (col. 2, lines 25-32 and col. 7, lines 40-47). The grids of [Larsen '451] may be used in any lead-acid cell or battery including, for example, automotive (flooded starting, lighting and ignition), bipolar and the like (col. 12, lines 12-17). Table 4 teaches a specific lead based alloy grid having 2.0% tin, 0.006% silver, 0.040% calcium and the balance lead. Note the alloy (Alloy E) has a ratio of tin to calcium of 50:1 (2/0.04).

The Examiner acknowledged that Larsen '451 "does not explicitly disclose a grid supporting structure having the alloy composition of the instant claims." However, the Examiner concluded that "the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because a prima facie case of obviousness exists

where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties," citing M.P.E.P § 2144.05.

Larsen '451 is directed to a "Lead-Acid Cell and Positive Plate and Alloy Therefor," and that is described as "allowing use in VRLA cells for motive power and stationary applications" (see col. 5, lines 10-12).[1] Larsen '451 discloses an alloy composition with tin in a range of about 1.5 percent to about 3.0 percent (see Abstract; col. 5, line 5; col. 7, lines 10-24; Examples 1-6). None of the specific examples given in Larsen '451 include tin in an amount less than 1.5 percent (see, e.g., Example 6). Larsen '451 does not identify any effect of tin in a range below 1.5 percent (see, e.g., Examples 1-6). Larsen '451 concedes that (emphasis added):

> As to the tin constituent, the issue is even more complex. Thus, while the tin level will certainly affect the characteristics as the grid is being cast and the mechanical properties of the cast grid, the tin level will also impact upon the issues of corrosion, cycling, thermal runaway, and capacity loss characteristics. These diverse criteria are not fully understood; and, despite the prior work in this field, the impact of the tin level on the characteristics of VRLA cells has not been appreciated to any great extent.

Col. 7, lines 1-9 (emphasis added). Larsen '451 nonetheless states that "[m]ore particularly, it is preferred to maintain the tin in the range of from about 2.0% to about 3.0%, more preferably 2.0% to 2.5%, by weight of the alloy." (col. 7, lines 10-18).

The alloy having a composition as recited in independent Claim 30 would not have been obvious in view of Larsen '451. Larsen '451 alone or in any proper combination, does not disclose, teach or suggest, a "lead-acid cell for an SLI battery" wherein the "thin grid supporting structure" comprises "tin in the range of about 0.8 percent to about 1.1 percent." Larsen '451 does not teach or show any recognition of either the alloy composition itself that is recited in the "lead-acid cell for an SLI battery configured for use in vehicle applications" as recited in independent Claim 30 or of the expected properties of the recited alloy composition. Claim 30 is clearly patentable over Larsen '451.

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[1] See also Larsen '451 at col. 1, lines 35-40 (describing "stationary applications") and lines 53-57 (describing "motive power application [sic]").

The alloy having a composition as recited in independent Claim 44 would not have been obvious in view of Larsen '451. Larsen '451 alone or in any proper combination, does not disclose, teach or suggest, a "grid supporting structure" wherein the "thin positive plate" comprises "tin in the range of about 0.8 percent to about 1.1 percent." Larsen '451 does not teach or show any recognition of either the alloy composition itself that is recited in the "lead-acid cell for an SLI battery configured for use in vehicle applications" as recited in independent Claim 44 or of the expected properties of the recited alloy composition. Claim 44 is clearly patentable over Larsen '451.

The alloy having a composition as recited in independent Claim 57 would not have been obvious in view of Larsen '451. Larsen '451 alone or in any proper combination, does not disclose, teach or suggest, a "plate formed by book mold gravity casting into a thin grid supporting structure" wherein the "lead-based alloy" comprises "tin in the range of about 0.8 percent to about 1.1 percent." Larsen '451 does not teach or show any recognition of either the alloy composition itself that is recited in the "lead-acid cell for an SLI battery configured for use in vehicle applications" as recited in independent Claim 57 or of the expected properties of the recited alloy composition. Claim 57 is clearly patentable over Larsen '451.

The alloy having a composition as recited in independent Claims 30, 44, and 57 would not have been obvious in view of Larsen '451, alone or in any proper combination under 35 U.S.C. § 103(a). Larsen '451 alone or in any proper combination does not disclose, teach or suggest a "lead-acid cell for an SLI battery" (independent Claim 30), a "grid supporting structure" (independent Claim 44) and a "plate formed by book mold gravity casting into a thin grid supporting structure" (independent Claim 57) comprising, in combination with other elements, the recited alloy composition (e.g., "tin in the range of about 0.8 percent to about 1.1 percent"). To transform the lead acid cell for motive power and stationary applications with a grid of an alloy having tin in a range of 1.5 percent to 3.0 percent of Larsen '451 into a "lead-acid cell for an SLI battery" (independent Claim 30), a "grid supporting structure" (independent Claim 44) and a "plate formed by book mold gravity casting into a thin grid supporting structure" (independent Claim 57), comprising tin in an amount of "about 0.8 percent to about 1.1 percent" would require still further modification, and such modification is taught only by the

Applicants' own disclosure. The suggestion to make the combination has been taken from the Applicants' own specification (using hindsight), which is improper.

The alloy having the composition recited in Claims 30-71, considered as a whole, would not have been obvious in view of Larsen '451. The rejection of Claims 30-71 over Larsen '451 under 35 U.S.C. § 103(a) is improper. Claims 30-71 are patentable over Larsen '451.

**Claim Rejections – 35 U.S.C. §§ 102(e) and 103(a) – Rao et al. '087 and Rao et al. '186**

On page 8 of the Office Action the Examiner rejected Claims 30-43, 57, 59-61 and 70 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,691,087 titled "Sealed Lead-Acid Cells and Batteries" to Rao et al. ("Rao et al. '087").

The Examiner stated that:

> [Rao et al. '087] teaches a sealed lead-acid cell or battery having positive plates made from an alloy of lead, from about 0.025 to about 0.06% calcium, from about 0.3 to about 0.9% tin and from about 0.015 to about 0.045% silver. See abstract.

Rao et al. '087 is directed to "sealed lead-acid cells and batteries" and purports to disclose an alloy having a silver content "from about 0.015 to 0.045%" (see Abstract). None of the specific examples given in Rao et al. '087 include a silver content in the range of "greater than 0 to less than 0.015 percent." Rao et al. '087 actually teaches that "[i]t is preferred to maintain the silver content in the range of 0.025 to 0.045%, and, more preferably, from 0.03 to 0.040%" (emphasis added) (see col. 10, lines 24-27).[2]

However, independent Claims 30 and 57 have been amended to recite an alloy having silver in an amount of "greater than 0 to less than 0.015 percent" to match independent Claim 44 (which was not subject to any rejection in view of Rao et al. '087 alone or in combination with Rao et al. '186).[3]

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[2] The purported disclosure of silver in or near 0.015 percent in Rao et al. '087 is not made with "sufficient specificity" to constitute an anticipation of Claims 30 and 57 under 35 U.S.C. § 102(e). See M.P.E.P. § 2131.03 ("In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with sufficient specificity to constitute an anticipation under the statute.").

[3] The Applicants have also provided evidence of unexpected results within the claimed range that are not appreciated by the disclosure of Rao et al. '087. See Declaration of M. Eric Taylor dated April 6, 2000 (filed in the

The subject matter recited in independent Claims 30 and 57, considered as a whole, is not identically disclosed by Rao et al. '087 under 35 U.S.C. § 102(e), and would not have been obvious over Rao et al. '087 as evidenced by Rao et al. '186 under 35 U.S.C. § 103(a) to a person of ordinary skill in the art. The rejection of Claims 30-43, 57, 59-61 and 70 under 35 U.S.C. § 102(e) as anticipated by, and alternatively under 35 U.S.C. § 103(a) as being unpatentable over, Rao et al. '087 as evidenced by Rao et al. '186 is improper. Therefore, Claims 30-43, 57, 59-61 and 70 are patentable.

**New Claims 72-85**

New Claims 72-83 have been added to present claims of varying scope. New independent Claim 72 is based on amended independent Claim 57 and is directed to a "plate formed by book mold gravity casting into a thin grid supporting structure" comprising, in combination with other elements, an alloy comprising "silver in an amount greater than 0 to about 0.0124 percent" and "tin in an amount of about 0.8 percent to about 1.1 percent."

New Claims 72-85 are believed to be patentable over the cited references of record.

* * *

The Applicants respectfully submit that each and every outstanding objection and rejection has been overcome, and the present Application is in a condition for allowance. The Applicants request reconsideration and allowance of pending Claims 30-83.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present Application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this Application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account 06-1447. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even

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prior U.S. Patent Application No. 09/337,830, now U.S. Patent No. 6,117,594 and provided in the present Application with the Reply and Amendment dated December 19, 2001).

entirely missing, the Commissioner is authorized to charge the unpaid amount to the Deposit Account No. 06-1447. If any extensions of time are needed for timely acceptance of papers submitted herewith, the Applicants hereby petition for such extension under 37 C.F.R. § 1.136 and authorize payment of any such extension fees to Deposit Account No. 06-1447.

Respectfully submitted,

Date 2/9/04 By _____

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